Social and behavioural barriers to achieving low-carbon retrofits in social housing

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Context

- The assumed effectiveness of retrofits often takes little account of the behavioural impacts of the end-user
  'Actual' effectiveness of a retrofit therefore may be overestimated (or indeed underestimated)
- Implications of this in a social housing context

The Project

- Retrofit Reality project with Gentoo Group (RSL in Sunderland)
- Sample of 100 households
- Key objective was identify technological, economic and behavioural challenges
- PhD focused on behavioural impacts of the project

Data Collection

- Qualitative approach, using semi-structured interviews with householders
- Discussion of day-to-day behaviours and practices in relation to the retrofit technologies
- 26 properties of the 100 households were interviewed
- Pre and post-retrofit interviews (12 months apart)
- The same household member was interviewed, and information was also gathered on other household members
- Analysis according to key themes and patterns

Retrofit Interventions

- 'Intervention' refers to an action or process of intervening to reduce energy consumption
- Aim is to not impact adversely on thermal comfort
- Combination of retrofit interventions and informational interventions
- Focus here is on the retrofit interventions and the facilities/circumstances existing pre and post-retrofit

Findings

- Facilities pre-retrofit and behavioural scenario
- Retrofit intervention
- Energy saving behaviour linked to interventions and impact post-retrofit
- Barriers

Facility Pre-retrofit and behavioural scenario (if applicable)

- Back boiler heating system with no programmable controls, controls in disrepair.

Linked Behaviour:

- A large majority of tenants did not programme central heating controls, due to not having access to the facility or not knowing how to use the facility.

Retrofit Intervention

- Installation of Central Heating System with Combi-boiler and digital control for temperature and timed programming.

Energy Saving Behaviour linked to interventions, and impact post-retrofit

- Programming central heating controls to come on at timed intervals.

Behavioural Impact:

- Less than half of tenants significantly changed behaviour to begin actively programming their central heating controls to come on at timed intervals.

Barriers

- More than half of the tenants did not understand how to programme the central heating and therefore did not change behaviours to programme central heating controls.
- Some tenants preferred not to use the central heating controls in preference for switching the boiler on and off manually, it is unclear if this method conserves more energy than programming central heating controls.

Facility Pre-retrofit and behavioural scenario
- Baths with small number of electric showers

Linked Behaviour:
- A majority of tenants only took baths and did this conservatively (e.g. sharing bath water) in order to save energy and due to inconvenience of long hot water heating period.

Retrofit Intervention
- Installation of mains fed showers providing instant hot water from combi-boiler.

Energy Saving Behaviour Linked to Interventions, and Impact Post-Retrofit
- Hot water use for bathing.

Behavioural Impact:
- Installation of the mains fed shower technology and combi-boiler, created a significant change in behaviour with almost half of tenants taking up showering as a main bathing method.

Barriers
- Tenants used hot water more frequently increasing the number of showers and in some cases baths after the interventions due to the convenience of the combi-boiler rather than the back boiler.
- Some tenants continued having baths because they liked having baths.
- Some tenants may have taken baths as this provides a warmer experience than showers and are willing to use more energy for this experience.
- Continued behaviours of using the bath instead of the shower may be linked to behaviours when the house was cold before the interventions, however some tenants did say bathrooms were still cold.
- Some tenants were unclear on which type of bathing consumed the most energy.

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Facility Pre-retrofit and behavioural scenario
- Single glazed windows and wooden doors with significant drafts. Ventilation brick for gas fire which created drafts.

Linked Behaviour:
- Tenants attempted to control drafts by putting curtains up at front and back doors, keeping doors closed and using draft excluders. Some tenants did not attempt to control drafts as they felt it was overwhelming and too time consuming.

Retrofit Intervention
- PVC Double glazed windows and doors were installed.

Energy Saving Behaviour Linked to Interventions, and Impact Post-Retrofit
- Controlling drafts.

Behavioural Impact:
- Installation of the external doors and double glazed windows technology as part of the retrofit intervention created a significant change in behaviour with almost half of the tenants ceasing draft controlling behaviour.

Barriers: none identified
- Not all windows and doors were draft proofed sufficiently and drafts still existed in the house. Hence more than half tenants still controlled drafts, post-retrofit.

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Facility Pre-retrofit and behavioural scenario
- Gas fire.

Linked Behaviour:
- All tenants used the gas fire as a source of heat due to ineffective central heating and perceptions of energy being wasted.

Retrofit Intervention
- Installation of (focal point) electric fire, with the aim of advising tenants not to use it for space heating as an alternative to the central heating.

Energy Saving Behaviour Linked to Interventions, and Impact Post-Retrofit
- Use of electric fire (not using).

Behavioural Impact:
- The replacement of the gas fire with an electric fire (in conjunction with central heating) technology from the retrofit intervention created a significant change in behaviour more than half of tenants.

Barriers
- A number of tenants stated a preference for using a fire for space heating instead of the central heating and nearly half of the tenants did not change behaviours and continued to use the electric fire.
- Some tenants regretted having the electric fire installed and would like to have their gas fire back.
- Tenants did not change behaviours because of perceptions and routines developed prior to the interventions which were continued afterwards.
- Tenants did not change behaviours due to being unaware or unclear on the most efficient way to use space heating.

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Opportunities

- Tenants are motivated to save energy mainly due to financial limitations
- They are also willing to adapt their behaviours to save energy, but this also needs to meet convenience and comfort requirements

Barriers

- Insufficient knowledge of, or skill with, technologies
- Behaviours interacting to influence energy efficiency

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Solutions to barriers

- Targeted long-term social learning programme, with feedback on monitoring
- Work with tenants to capitalise on their existing energy efficient behaviours and practices and motivations to save energy
- Development of retrofit standards of practice based on feedback from social learning programmes

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